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| 6449 7590 03/27/2008 ROTHWELL, FIGG, ERNST & MANBECK, P.C. 1425 K STREET, N.W. SUITE 800 WASHINGTON, DC 20005 | | | | |
| EXAMINER | | | | |
| GROSS, CHRISTOPHER M | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-PAT-Email@rfem.com

Office Action Summary

Application No.

09/763,607

Applicant(s)

STAHLER ET AL.

Examiner

CHRISTOPHER M. GROSS

Art Unit

1639

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13-18, 21-23, 27-52, 56 and 57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-18, 21-23, 27-52, 56 and 57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/3508)
Paper No(s)/Mail Date 1/10/2008
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Responsive to communications entered 1/9/2008. Claims 1-11, 13-18, 21-23, 27-52, and 56-57 are pending. Claims 1-11, 13-18, 21-23, 27-52, and 56-57 are examined herein.

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/9/2008 has been entered.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Priority

This application has a filing date 4/19/2001 and is a 371 of PCT/EP99/06316 filed 8/27/1999, which claims priority to German application(s): 19,839,255.9 filed 08/28/1998; 19,839,256.7 filed 08/28/1998; 19,907,080.6 filed 02/19/1999; 19,924,327.1 filed 05/27/1999 and 198 39 254.0 filed 08/28/1998

Receipt is once acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Withdrawn Rejection(s)

The provisional rejection of claims 1, 8, 14, and 16 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 6, and 35 of copending Application No. 09/763,914 is hereby withdrawn in view of applicant's filing of a terminal disclosure concerning US Patent 7097974, to which Application 09/763,914 has now matured.

The rejection of claims 1-11, 13-18, 21-23, 27-52, and 56-57 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. is hereby withdrawn in view of applicant's persuasive arguments.

Maintained Claim Rejection(s) - 35 USC § 103

Claims 1-4, 7-11, 13-17, 21-23, 46-49, 51 and 52 and 18,50,42,43 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Pirrung et al.** (US Patent 5,143,854) in view of **Derndinger et al.** (US Patent 5,239,178).

The claimed subject matter per claim 1 is drawn to method for coating a biochip carrier with biologically or chemically functional materials, which comprises:

(a) providing a biochip carrier having a surface which comprises photoactivatable groups located on predetermined areas of said biochip carrier surface, an illumination matrix and a detector which comprises a light sensor matrix, wherein said light sensor matrix and said illumination matrix are arranged facing each other and said biochip carrier is situated in the light path between said illumination matrix and said light sensor matrix;

(b) activating said photoactivatable groups on at least a predetermined area of said biochip carrier surface by location-specific illumination of said predetermined area of said biochip carrier surface using said illumination matrix to generate an adjustable location-specific illumination pattern;

(c) detecting said location-specific illumination pattern using a light sensor matrix and optionally adjusting said illumination pattern;

(d) binding materials selected from the group consisting of (1) biologically functional materials, (2) chemically functional materials, (3) building blocks for said biologically functional materials and (4) building blocks for said chemically functional materials on said predetermined area of said biochip carrier surface; and

(e) repeating the activating, detecting and binding steps on the same or a different predetermined area of said biochip carrier surface.

The detector comprises a light sensor matrix.

The carrier having a surface comprises photoactivatable groups located on predetermined areas of said carrier surface.

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*In step (c) of the presently claimed method, the limitation is base on the instant claimed term "optionally", the broadest definition of the term "optionally" is applied, i.e. it is a choice. Thus, this method step is broadly interpreted as **either** being included in the method **or** not, i.e. it can be interpreted that the step of optionally adjusting said illumination pattern is omitted from the presently claimed method.*

Claims 2-4, 7-11, 13-17, 21-23, 46-49, 51 and 52 and 18,50,42,43 represent variations thereof.

Please note that claims 18,50,42 and 43 are newly rejected in this office action, as it was discovered that Pirrung et al teach the limitations set forth in said claims (see below). Also note that this rejection has been modified from the original version to more clearly address applicants' newly amended and/or added claims and/or arguments.

Pirrung et al. disclose throughout the document methods and apparatus for the preparation and use of a substrate having a plurality of polymer sequences in predefined regions (see e.g. Abstract; col. 3, lines 6-38; col. 8, lines 17-19).

The substrate (refers to instant claimed biochip carrier) comprises an etched surface (refers to instant claimed predetermined area) and linker molecules on the surface of the substrate wherein the linker molecules are provided with a photoremovable protective group (refers to instant claimed photoactivatable groups)(see e.g. col. 3, lines 8-11; col. 8, lines 1-7 and 60-65; col. 11, lines 42-50; col. 12, lines 43-57). The substrate materials include materials such as glass, silicon, and polymers (refers to instant claims 8, 9, 47, and 48)(see e.g. col. 11, lines 29-41). The apparatus for the preparation of the substrate (refers to instant claimed illumination

matrix) comprises a light source and a mask (see e.g. col. 3, lines 34-38; col. 13, lines 36-67; col. 14, lines 5-59).

The method comprises the steps of removing the photoremovable protective group on the linker molecules that are attached to the surface of the substrate by exposing the photoremovable protective group to light using a mask to direct light from the light source to selected regions on the substrate (refers to instant claimed steps (a) and (b), and instant claim 17), attaching the monomer (e.g. Nvoc-Phenylalanine, as set forth in figure 14A of Pirrung et al) to the surface of the substrate by reacting the monomer with the exposed functional group on the surface of the substrate (refers to instant claimed step (d) (3 or 4), and the steps (i.e. the removing and attaching steps) are repeated to selectively apply monomers until polymers of a desired length and chemical sequence are obtained (refers to instant claimed step (e) and instant claims 15, 22, and 23)(see e.g. col. 3, lines 8-38; col. 8, lines 17-33 and 46-65; col. 9, line 14 thru col. 10, line 30; col. 14, line 60 thru col. 15, line 48; figs. 1-7). The removing step generates a pattern of light and dark areas by selectively irradiating at least a first area of a surface of the substrate (refers to instant claims 4 and 11)(see e.g. figs. 15 A; claims 1). The area ranges from $1\text{ }\mu\text{m}^2$ to $10,000\text{ }\mu\text{m}^2$ (refers to instant claims 10 and 49)(see e.g. col. 15, lines 56-63; claim 6). The method produces an array of different polymers (refers to instant claim 16)(see e.g. col. 15, line 64 thru col. 16, line 8) and the polymers include nucleic acids, polysaccharides, or peptides (refers to instant claimed biological or chemically functional materials, and claims 13, 14, 51, and 52). The

radiation used includes ultraviolet (UV), infrared (IR), or visible light (refers to instant claims 2 and 3)(col. 8, lines 66-67; col. 13, line 29 thru col. 14, line 59).

Pirrung et al teach exposure times from 1 to 500 seconds, which overlaps with the illumination rate ranges set forth in claims 18, 50, 42 and 43. In particular, 1 light pattern per second corresponds to an exposure time of 1 second per Pirrung et al.

The method and apparatus of Pirrung et al. differs from the presently claimed invention by failing to include an illumination matrix comprising a diode array, a detector comprising a light sensor array, and the step of *detecting* the illumination pattern using the detector.

Derndinger et al. disclose throughout the document a device for three-dimensional examination of object (see e.g. Abstract; col. 1, line 53 thru col. 2, line 2). The device comprises an illumination grid, a detector grid, and optical elements to image the illumination grid in a focal plane and to image the focal plane on the detector grid (see e.g. col. 1, line 56-62; col. 2, lines 3-23; col. 5, line 41 thru col. 6, line 59; claims 1 and 22). The detector grid includes a plurality of independent detector elements and is a CCD (Charge Coupled Device) receiver (refers to instant claimed light sensor matrix and instant claim 46)(see e.g. col. 3, lines 20-49; col. 5, line 41-53; col. 6, line 9-19; claims 3, 17, and 23). The illumination grid is produced by a light source array such as individual LEDs (light emitting diode) or liquid crystal display (refers to instant claim 7)(see e.g. col. 3, line 61 thru col. 4, line 2; col. 6, line 41-59; col. 7, lines 58-68). The CCD receiver is connected to a computer such that adjustment of the illumination grid and/or the object of examination can be made (refers to instant

claimed step of "*optionally adjusting said illumination pattern*", and instant claim 21)(see e.g. col. 4, lines 7-23; claims 17 and 18). The device is use to detect the image pattern of the object (refers to instant claimed step (c))(see e.g. col. 2, lines 55-68).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include an illumination matrix comprising a diode array, a detector comprising a light sensor array, and the step of detecting the illumination pattern using the detector as taught by Derndinger et al. in the method and apparatus of Pirrung et al.

One of ordinary skill in the art would have been motivated to include an illumination matrix comprising a diode array in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein each individual light source can be controlled (Derndinger: col. 3, lines 62-68) since Pirrung et al. disclose any type of device with a means for controlling the location of light exposure can be use (Pirrung: col. 14, lines 41-59). Moreover, one of ordinary skill in the art would have been motivated to include a detector that comprises a light sensor array and the step of detecting the illumination pattern using the detector in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein the illumination grid can be adjusted (Derndinger: col. 4, lines 7-23) since Pirrung et al. disclose that any type of alignment technique can be use to accurately overlay successive masks (Pirrung: col. 13, lines 63-67).

Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Pirrung et al. and Derndinger et al. because the type of

device use to produce and control the illumination pattern on the surface of the substrate would be a choice of experimental design and is considered within the purview of the cited prior art.

Therefore, the combine teachings of Pirrung et al. and Derndinger et al. do render the invention of the instant claims *prima facie* obvious.

Response to Arguments

Applicant argues (i) Derndinger et al represents non-analogous art; (ii) not all elements are taught.

Applicant's arguments have been fully considered but they are not deemed persuasive for the following reasons.

(i) Applicant argues, see 2 paragraph 2 (1/9/2007), that confocal microscopy, such as advocated by Derndinger et al, represents non analogous art not pertinent to synthesis of microarrays, because applicant contends confocal microscopy is only used to view or photograph a *completed* array.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., chemical synthesis) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Notably, independent claims 1, 27 and 56 are each drawn to a method for coating a biochip carrier, not limited to only the chemistry involved in microarray

manufacturing. The examiner submits that coating a biochip carrier is considerably broader than chemical synthesis and may include steps directed toward hybridization. It is also noted, the transitional phrase "comprising" does not exclude additional coating steps related to hybridization.

In this vein, p 21 lines 1-28 of the present specification mentions, "The arrangement of a highly parallel illumination matrix and a highly parallel light sensor matrix creates a widely usable, novel inspection unit...In DNA analysis, for example, **detecting a hybridization** directly in a reaction area would be conceivable." Emphasis Added. As mentioned in the last office action, evidence provided in US Patent 6114123 to Murry et al in column 22, lines 34-35 indicates "To **detect signals** produced by a fluorescent probe **hybridized** on a microarray, the substrate is examined by confocal laser microscopy." Emphasis Added. The examiner submits confocal microscopy and the novel inspection unit of the present case may both examine hybridization and therefore the confocal microscopy of Derndinger et al represents analogous art.

(ii) First applicant argues, see paragraph bridging pp 2-3 through first full paragraph on p 3 (1/9/2007), Derndinger et al do not teach (a) an adjustable location specific illumination pattern and (b) the combination of references do not teach detecting whether light is correctly illuminating particular desired locations.

(a) Applicant contends the adjusting device of Derndinger et al in column 4, lines 13-17 is limited to focusing in different planes within a sample perpendicular to the optical axis direction (i.e. along the z axis). In this regard, applicants' attention is respectfully invited to column 6, lines 9-11 and the paragraph bridging columns 6 and 7

which describe the piezo drive (adjustment device) in greater detail. In particular, as shown in figures 1-3 of Derndinger et al, said piezo drive may displace the illumination grid in all three dimensions in space (i.e. in x, y and z directions) with respect to sample element 14. Said piezo drive affords the capability of examining planes along z, as applicant mentions, *as well as* moving in x and y directions so that, for example, the illumination grid (element 32l) may imaged in photosensitive as well as non-photosensitive areas of the CCD camera (element 17, the sensor matrix). Notably, a CCD camera is similarly reflected in claims 23 and 46 of the present application and different planes of illumination are reflected in claim 3 of the present application. The examiner therefore submits that the piezo drive of Derndinger et al quite adjustable, providing movement in all three spatial dimensions and, like the present application, can used in concert with a CCD camera.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Here, a location specific illumination pattern is provided by Pirrung et al. See, for instance figures 10B,D,F, etc of Pirrung et al which show three different masks for generating three different illumination patterns.

Additionally, the examiner submits, the piezo drive adjustment device of Derndinger et al not withstanding, giving the claims the broadest reasonable

interpretation, in swapping the three difference masks according to Pirrung et al, the illumination pattern is "adjusted," such as set forth in claim 1(b) line 3.

(b) In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., correct illumination) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Second applicant argues, see p 5 first full paragraph lines 8-9 that Pirrung et al fail to disclose an illumination matrix.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Here, a location specific illumination pattern is provided by Derndinger et al. See, for instance elements 12, 22, 31 and 83 of figures 1, 2, 3 and 8 respectively which according to Derndinger et al are illumination grids. The examiner submits that illumination grids are synonymous with illumination matrices.

Claims 27-41, 44, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Pirrung et al.** (US Patent 5,143,854) in view of **Derndinger et al.** (US Patent 5,239,178).

Claims 56 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Pirrung et al.** (US Patent 5,143,854) in view of **Derndinger et al.** (US Patent 5,239,178).

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Pirrung et al.** (US Patent 5,143,854) in view of **Derndinger et al.** (US Patent 5,239,178) as applied to claims 1-4, 7-11, 13-17, 21-23, 46-49, 51, and 52 above, and further in view of **Cerrina et al.** (US Patent 6,375,903 B1).

Response to Arguments

Applicant does not offer further arguments regarding the above obviousness rejections beyond what was set forth with regard to the 35 U.S.C. § 103 rejection, above. To the extent that Applicant is merely repeating their previous argument, the Examiner contends that those issues were adequately addressed in the above section, which is incorporated in their entirety herein by reference.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Gross whose telephone number is (571)272-4446. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. Douglas Schultz can be reached on 571 272-0763. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Art Unit: 1639

Christopher M Gross

Examiner

Art Unit 1639

Cg

/Mark L. Shibuya, Ph.D./

Primary Examiner, Art Unit 1639